Case Reports

Percutaneous Thrombin Injection

of Common Carotid Artery Pseudoaneurysm without Cerebral Protection

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An 83-year-old man with sepsis sustained right common carotid artery injury during attempted central-line placement. A computed tomographic scan showed a large hematoma in the patient's neck and a carotid pseudoaneurysm. His clinical condition was such that transfer to the interventional suite was judged unsafe. Percutaneous thrombin injection was performed at the bedside under ultrasonographic guidance, but without protective temporary balloon occlusion. The procedure was successful, with no neurologic complications. At follow-up ultrasonographic evaluation, there was complete and sustained occlusion of the pseudoaneurysm.

Emergent percutaneous treatment of common carotid artery pseudoaneurysm can be performed without temporary balloon occlusion for cerebral protection—in extreme circumstances, and at unknown risk. ***(Tex Heart Inst J 2012;39(5):696-8)***

Accidental puncture of the common carotid artery during internal jugular vein central venous catheter placement is rare. When confronted with an acutely ill patient with sepsis who had sustained a large hematoma and common carotid artery pseudoaneurysm and had a recent history of resuscitation after cardiac arrest, we performed ultrasound-guided percutaneous injection of thrombin at the bedside, without temporary balloon occlusion for cerebral protection.

Key words: *Aneurysm, false/drug therapy; carotid artery injuries; catheterization, central venous/adverse effects; hematoma/etiology; iatrogenic disease; infusions, intravenous; jugular veins; thrombin*

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Case Report

An 83-year-old man with a history of ischemic heart disease, sick sinus syndrome treated with a pacemaker, benign prostatic hypertrophy, and chronic obstructive pulmonary disease presented at the hospital with sepsis of unknown origin. He was not taking oral anticoagulants or antiplatelet medications.

Placement of a right internal jugular line was deemed necessary for antibiotic administration and fluid resuscitation. An attempt was made at central-line insertion with use of a BD Careflow™ kit (BD Medical Surgical Systems; Stockholm, Sweden), via the right internal jugular vein. Ultrasonographic guidance was not used. The common carotid artery was punctured with a 17G needle. Arterial injury was immediately recognized. The needle was removed and compression was applied at the insertion site. Despite compression, a large hematoma formed immediately. The patient went into respiratory failure. He was intubated and admitted to the intensive care unit (ICU). On postprocedural day 4, a computed tomographic scan of the neck revealed a pseudoaneurysm of the right common carotid artery and a large hematoma in the neck (Fig. 1). The pseudoaneurysm was 2 × 1.5 × 1.7 cm and had an 8-mm-long neck.

Upon return to the ICU, the patient developed ventricular fibrillation. Cardiopulmonary resuscitation was performed, and advanced cardiac life support protocols were initiated. The patient reverted to sinus rhythm within 2 min after defibrillation. After resuscitation, expedient treatment of the newly diagnosed pseudoaneurysm was believed to be necessary, because the hematoma was enlarging; hence, the ICU team obtained vascular surgical and interventional radiological consultations. The consulting interventional radiologist recommended transfer to the interventional suite for angiography and temporary balloon occlusion. However, because of the patient's dire condition, the consulting vascular surgeon and the ICU anesthesiologist considered such transfer unsafe. A decision was made to proceed with bedside percutaneous injection of thrombin, without neuroprotection.

Bedside ultrasonography showed the large pseudoaneurysm well (Fig. 2). The aneurysm was 2.3 cm on ultrasonography and was connected to the common carotid artery by an 8-mm-long neck, which was estimated to be 2 mm wide. We used the thrombin component of a Tisseel® Duo Quick kit (Baxter AG; Vienna, Austria), containing thrombin 500 IU per 1 mL. With real-time ultrasonographic guidance, we placed a 21G needle in the center of the pseudoaneurysm and injected a total of 75 units of thrombin. After injection, there was no flow in the pseudoaneurysm, but flow was maintained in the parent carotid artery (Fig. 3).

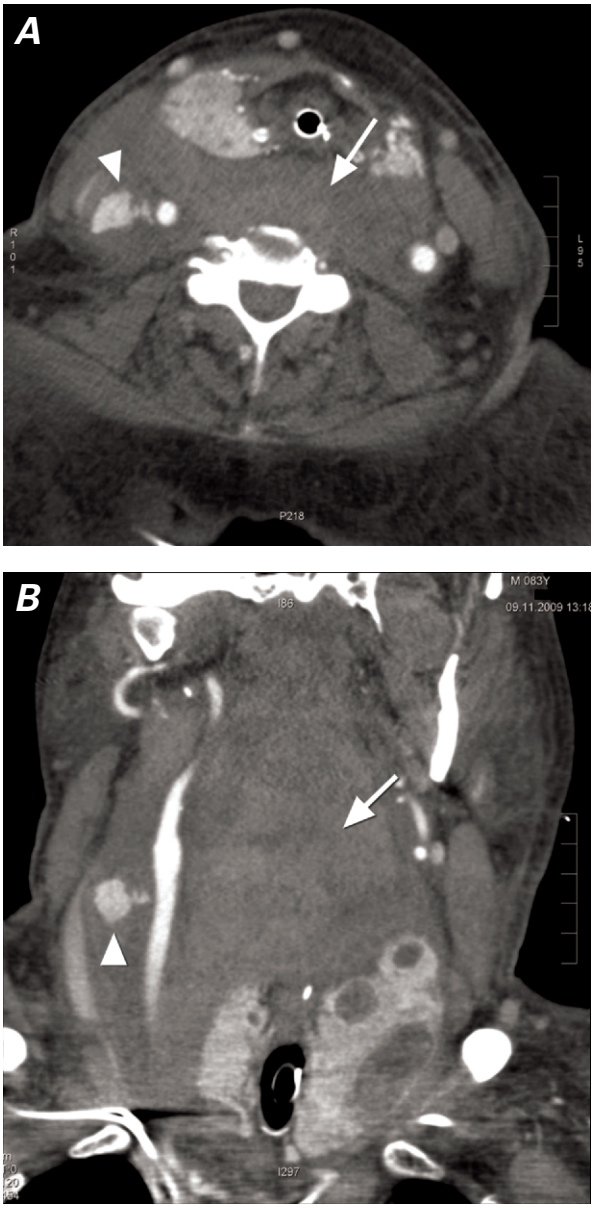

Fig. 1 ***A****) Axial and* ***B****) coronal computed tomographic images of the neck with contrast show the common carotid artery pseudoaneurysm (arrowhead) with a relatively long, narrow neck and large hematoma (arrow) in the surrounding soft-tissue planes.*

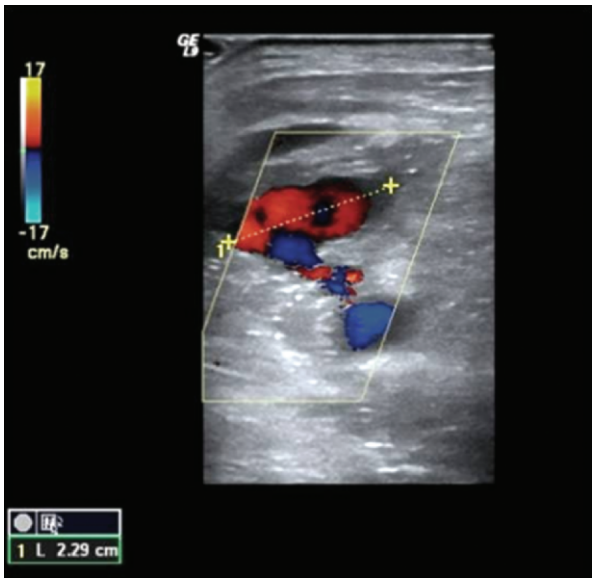

Fig. 2 *Axial color-flow Doppler ultrasonographic image shows the pseudoaneurysm, marked with calipers, and the common carotid artery located posterior and medial to the pseudoaneurysm.*

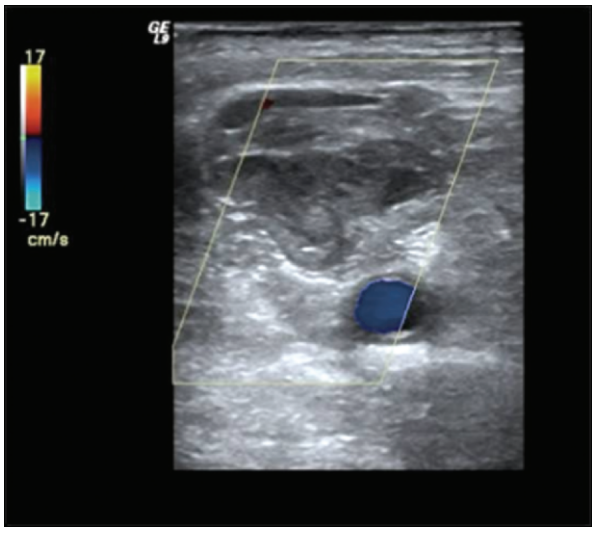

Fig. 3 *Axial color-flow Doppler ultrasonographic image in an orientation similar to that seen in Figure 2, after the injection of thrombin, shows thrombosis of the pseudoaneurysm with maintained flow in the common carotid artery.*

The pseudoaneurysm remained occluded at follow-up ultrasonography (1, 2, and 3 days after thrombin injection). The patient did not experience any further cardiac arrhythmia, nor did he show symptoms of focal neurologic deficit. Due to the presence of a cardiac pacemaker, the patient could not undergo magnetic resonance imaging, but postprocedural computed tomographic examinations of his brain at 10 days, 4 weeks, and 2 months showed no signs of infarction. The focus of infection was identified as discitis; the patient

was treated medically and was eventually discharged to a skilled nursing facility.

Discussion

Although figures vary, accidental puncture of the common carotid artery during the blind placement of a central venous catheter in an internal jugular vein is estimated to occur in 3.2% of cases.[1,2] Development of a pseudoaneurysm after such an accidental puncture of the carotid artery is very rare; a large study showed no clinically significant pseudoaneurysm formation after such an occurrence.[1] Death secondary to inadvertent carotid artery puncture, although described in the literature, is exceedingly rare and in the available report[3] was secondary to infarction after manual compression of a carotid hematoma. Ultrasonographic guidance should always be used during central venous catheter placement, for it has been shown to improve the success rate and to decrease complications.[4] There are several reports of percutaneous treatment of carotid artery pseudoaneurysm, among them a report of percutaneous injection of thrombin with use of temporary balloon occlusion for cerebral protection.[5] For femoral artery pseudoaneurysm, percutaneous thrombin injection is considered the standard treatment; even though temporary balloon occlusion is rarely used, embolic complications are highly infrequent (a prospective study showed no such events in 274 patients treated).[6] Endovascular placement of a stent-graft as a means of repair has also been described.[7] To our knowledge, there are no prior published reports of percutaneous thrombin injection to treat a carotid artery pseudoaneurysm without temporary balloon occlusion for neuroprotection. In the setting of hemodynamic instability, emergent percutaneous thrombin injection to treat a carotid artery pseudoaneurysm can be performed without neuroprotection—but at unknown risk.

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